

To: Members of Working Group X4A9.1

Subject: Proposed ASCII Keyboard Arrangement

The proposed keyboard arrangement shown in Figure I is based on the following assumptions:

1. Any keyboard for implementing the American Standard Code for Information Interchange must be capable of generating the ASCII code for transmission on-line or for recording the code in media for subsequent transmission.
2. It follows from the first assumption that there should be a logical pairing of characters on key tops.
3. All graphic characters should be included.
4. Very few typewriter-like devices will be required to generate every control character in the ASCII. The following control characters are essential for some communications devices and should be included in the standard:
 - (a) Line feed
 - (b) Carriage return
 - (c) Delete
 - (d) Enquiry
 - (e) Bell
 - (f) Escape
 - (g) Horizontal tabulation
 - (h) Vertical tabulation
5. The benefits to be derived from a standard keyboard arrangement which included every ASCII character would not justify the time and effort required to reach agreement on such a standard.

6. Compromises will be necessary in order to develop a standard which will be acceptable to both typists and communications operators.

7. Monocase ASCII keyboards will be used in many low-cost devices; therefore, an effort should be made to place all graphics in columns two through five of the code table within the 44 key area.

If the first assumption is not correct, the scope of the proposed standard, as given in Document X4A9.1/79, should be revised to specify that the arrangement is intended for alpha-numeric keyboards associated with devices whose primary function is to print the graphic characters in the ASCII. (In other words, a typewriter keyboard.)

The key pairings in X4A9.1/79 are the optimum for communications and data processing devices. Since some of these pairings appear to be unacceptable to typewriter-oriented specialists, the following pairings are suggested as one possible compromise:

1. The semicolon and colon.
2. The comma with itself.
3. The period with itself.
4. The plus sign and asterisk.

Pairing the semicolon with the colon retains the traditional typewriter pairing, but sacrifices the logical pairing of the semi-colon with the plus sign. If the inversion of bit 1 required by this proposed pairing is acceptable, then it appears logical to pair the plus sign and asterisk, which also involves inversion of bit 1.

Providing the comma and period in both the shifted and unshifted modes requires relocation of the "less than" and "greater than" signs. These two graphics have been assigned to discrete keys in Figure 1.

As a result of changes made in the proposed revised (1966) ASCII code at a meeting of Sectional Committee X3 on June 20, two other changes were made in the pairing shown in X4A9.1/79. The vertical line is paired with the reverse slash; and the overline is paired with the circumflex. Figure 2 shows the status of the proposed revised ASCII as of June 20, 1966.

Western Union's experience with several different types of communications and data processing systems, in which more than a thousand monospace ASCII keyboards are being used, supports the assumption that very few ASCII keyboards will be required to generate all of the control characters. Furthermore, experience has demonstrated that use of a control key in conjunction with graphic keys to generate most of the control characters is both efficient and economical. Two control keys have therefore been included in the proposed arrangement and ten of the control characters which can be generated in this manner are also included. These ten were chosen because experience with monospace ASCII keyboards has shown that these are among the twelve most frequently used controls. (Carriage return and line feed are the two most frequently used.)

Unfortunately, the suggested compromises resulted in eight relatively low usage characters in columns two through five being located outside the 44 key area.

The standard should provide for a monospace ASCII keyboard. Since there appears to be no advantage in having the comma and period in both the shifted and unshifted modes in monospace keyboards, the logical pairings of the comma with the "less than" sign and the period with the "greater than" sign, should be either specified or permitted in monospace keyboards.



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COLUMN →		0	1	2	3	4	5	6	7
ROW ↓	b7 →	0	0	0	0	1	1	1	1
	b6 →	0	0	1	1	0	0	1	1
	b5 →	0	1	0	1	0	1	0	1
	b4 ↓ b3 ↓ b2 ↓ b1 ↓								
0	0 0 0 0	NUL	DLE	SP	0	@	P	\	p
1	0 0 0 1	SOH	DC1	!	1	A	Q	a	q
2	0 0 1 0	STX	DC2	"	2	B	R	b	r
3	0 0 1 1	ETX	DC3	#	3	C	S	c	s
4	0 1 0 0	EOT	DC4	\$	4	D	T	d	t
5	0 1 0 1	ENQ	NAK	%	5	E	U	e	u
6	0 1 1 0	ACK	SYN	&	6	F	V	f	v
7	0 1 1 1	BEL	ETB	'	7	G	W	g	w
8	1 0 0 0	BS	CAN	(	8	H	X	h	x
9	1 0 0 1	HT	EM	)	9	I	Y	i	y
10	1 0 1 0	LF	SUB	*	:	J	Z	j	z
11	1 0 1 1	VT	ESC	+	;	K	[	k	{
12	1 1 0 0	FF	FS	,	<	L	\	l	|
13	1 1 0 1	CR	GS	-	=	M	]	m	}
14	1 1 1 0	SO	RS	.	>	N	^	n	~
15	1 1 1 1	SI	US	/	?	O	_	o	DEL


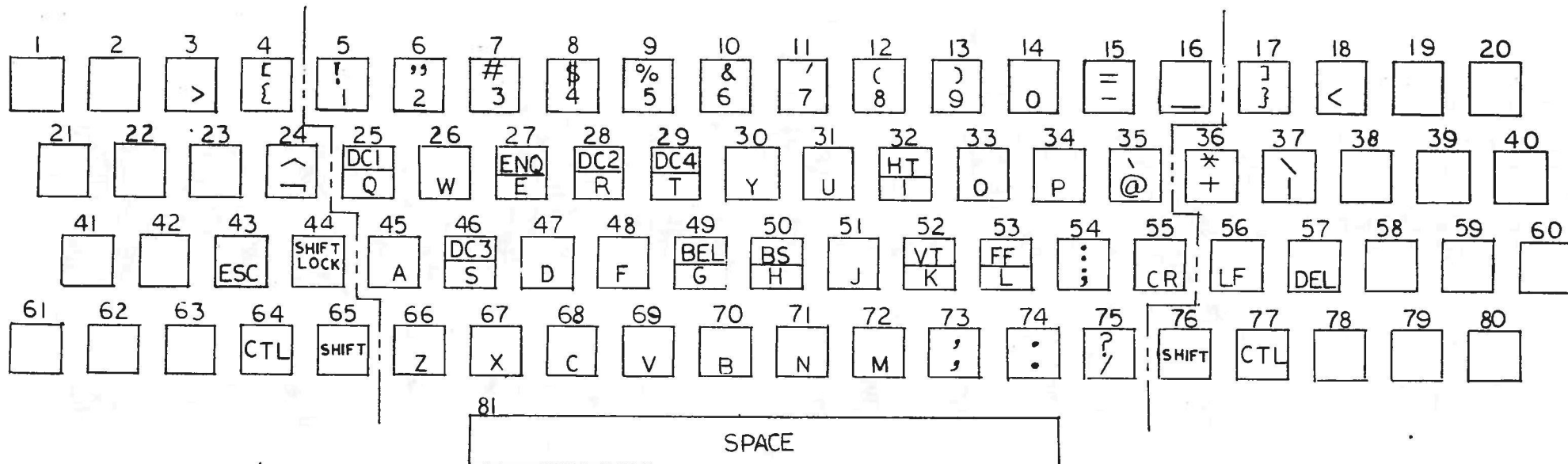
 INDICATES BIT 8 IS A ONE, OR MARKING PULSE, FOR EVEN PARITY

FIGURE 2



LEGEND:

DC1 ← CONTROL CHARACTER
Q ← GRAPHIC CHARACTER

CTL = CONTROL KEY

FIGURE 1